Powerful CARMA Brings Cool, Far Out Astrophysics More in Focus

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This Friday, May 5, astronomers from the University of Maryland, the University of California at Berkeley, the University of Illinois at Urbana-Champaign and the California Institute of Technology will dedicate the world's most powerful millimeter-wave-length radio telescope.

Formed from a linked array of 15 radio telescope dishes perched high in the cool, dry desert of eastern California's Inyo Mountains, the Combined Array for Research in Millimeter-wave Astronomy, or CARMA, will give scientists unprecedented power to look across the universe (and back in time) to learn more about the birth of galaxies, stars, planets and even the universe itself.

"Most of what we know about the universe has come from optical or light-observing telescopes," said University of Maryland astronomy professor Stuart Vogel, who chairs the science steering committee for

CARMA. "However, each part of the electromagnetic spectrum opens new windows on the universe, and the millimeter-wave portion of the spectrum is the ticket for observing the universe's coldest matter, gas that is only tens of degrees above absolute zero."

"It turns out that planets, stars and even galaxies are assembled from this very cold gas," said Vogel, who is director of the University of Maryland's Laboratory for Millimeter-wave Astronomy. "What's special about CARMA is that it has the resolving power and sensitivity to observe this cold gas."

Developing the CARMA site involved moving the nine 6-meter telescopes at the Berkeley-Illinois-Maryland Association array and the six 10-meter telescopes at Caltech's Owens Valley Radio Observatory to the higher elevation Cedar Flat location, and adding new, updated technology.

The result is a larger and much more powerful millimeter-wave radio telescope. Scientists chose to create CARMA at the Cedar Flat site in the Inyo Mountains because the 7,200 ft elevation gets them above much of the atmospheric water vapor that reduced the sensitivity of the lower elevation constituent arrays.

"We're recycling the two U.S. millimeter arrays to make a new telescope that will be ten times more powerful than what existed before," said Vogel, who was a director of the Berkeley-Illinois-Maryland Association array prior to its incorporation into CARMA. "It's hard to believe that after a decade of pushing, it's finally happening. We can't wait to start using CARMA."

Astronomers using CARMA will peer into the hearts of galaxies to study the cold molecular gas that fuels star formation and feeds massive black holes. They also will study the disk shaped clouds of gas and dust

surrounding newly forming stars that are believed to be the nurseries of planets formation, and look for chemical precursors to life in those same clouds. And through studies of cosmic microwave background radiation, CARMA will provide opportunities for new insights into the nature of dark energy and the origin and early evolution of the universe.

"These observations will address some of the most important questions in astrophysics today," said Current CARMA director Anneila Sargent , who is Rosen Professor of Astronomy at Caltech. "These include how the modern universe and the first stars and galaxies formed and evolved, how stars and planetary systems like our own are formed, and what the chemistry of the interstellar gas can tell us about the origins of life."

The new array is funded by National Science Foundation and the participating universities. It is operated by the CARMA Association comprised of the four partner universities. The association coordinates the separate activities of its members through a board of representatives that includes senior administrators from each partner university and the CARMA science steering committee, made up of an equal number of scientists from Caltech and the Berkeley-Illinois-Maryland Association.

Links: Combined Array for Research in Millimeter-wave Astronomy (CARMA)

Source: University of Maryland